

**SMF5.0(C)A  
 THRU  
 SMF170(C)A**

**200WATTS TRANSIENT  
 VOLTAGE SUPPRESSOR  
 5.0 TO 170 VOLTS**

**Features**

- Halogen free available upon request by adding suffix "-HF"
- Stand-off Voltage 5-170 Volts
- Uni and bi-directional type available (suffix "C" means bi-directional)
- Surface Mount
- Low Clamping Voltage
- 200 Watt Peak Power Dissipation
- Small, High Thermal Efficiency
- Marking Code: See Electrical Characteristics Table
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- Lead Free Finish/RoHS Compliant (NOTE 1) ("P" Suffix designates RoHS Compliant. See ordering information)

**Maximum Ratings**

- Operating Temperature: -65°C to +175°C
- Storage Temperature: -65°C to +175°C

**Electrical Characteristics @ 25°C Unless Otherwise Specified**

Peak Pulse Power (10/1000us Waveform)	P <sub>PP</sub>	200W
ESD Voltage(HBM)	V <sub>ESD</sub>	>16KV

Note: 1. High Temperature Solder Exemption Applied, see EU Directive Annex Notes 7



## SMF5.0A THRU SMF170A

### ELECTRICAL CHARACTERISTICS @25°C

MCC PART NUMBER Uni-Polar	Marking Code	Breakdown Voltage $V_{BR} @ I_T$ (Volt)		TEST CURRENT $I_T$  mADC	RATED STANDOFF VOLTAGE $V_{WM}$  V	MAXIMUM REVERSE LEAKAGE $I_b @ V_{WM}$  ( $\mu$ A)	MAXIMUM CLAMPING VOLTAGE $V_C @ I_{PP}$  V	MAXIMUM PEAK PULSE CURRENT $I_{PP}$  A
		MIN	MAX					
SMF5.0A	5.0A / KE	6.4	7.0	10	5.0	400	9.2	21.7
SMF6.0A	6.0A / KG	6.67	7.37	10	6.0	400	10.3	19.4
SMF6.5A	6.5A / KK	7.22	7.98	10	6.5	250	11.2	17.9
SMF7.0A	7.0A / KM	7.78	8.6	10	7.0	100	12	16.7
SMF7.5A	7.5A / KP	8.33	9.21	1.0	7.5	50	12.9	15.5
SMF8.0A	8.0A / KR	8.89	9.83	1.0	8.0	25	13.6	14.7
SMF8.5A	8.5A / KT	9.44	10.4	1.0	8.5	10	14.4	13.9
SMF9.0A	9.0A / KV	10	11.1	1.0	9.0	5.0	15.4	13
SMF10A	10A / KX	11.1	12.3	1.0	10	2.5	17	11.8
SMF11A	11A / KZ	12.2	13.5	1.0	11	2.5	18.2	11
SMF12A	12A / LE	13.3	14.7	1.0	12	2.5	19.9	10.1
SMF13A	13A / LG	14.4	15.9	1.0	13	1.0	21.5	9.3
SMF14A	14A / LK	15.6	17.2	1.0	14	1.0	23.2	8.6
SMF15A	15A / LM	16.7	18.5	1.0	15	1.0	24.4	8.2
SMF16A	16A / LP	17.8	19.7	1.0	16	1.0	26	7.7
SMF17A	17A / LR	18.9	20.9	1.0	17	1.0	27.6	7.2
SMF18A	18A / LT	20	22.1	1.0	18	1.0	29.2	6.8
SMF20A	20A / LV	22.2	24.5	1.0	20	1.0	32.4	6.2
SMF22A	22A / LX	24.4	26.9	1.0	22	1.0	35.5	5.6
SMF24A	24A / LZ	26.7	29.5	1.0	24	1.0	38.9	5.1
SMF26A	26A / ME	28.9	31.9	1.0	26	1.0	42.1	4.8
SMF28A	28A / MG	31.1	34.4	1.0	28	1.0	45.4	4.4
SMF30A	30A / MK	33.3	36.8	1.0	30	1.0	48.4	4.1
SMF33A	33A / MM	36.7	40.6	1.0	33	1.0	53.3	3.8
SMF36A	36A / MP	40	44.2	1.0	36	1.0	58.1	3.4
SMF40A	40A / MR	44.4	49.1	1.0	40	1.0	64.5	3.1
SMF43A	43A / MT	47.8	52.8	1.0	43	1.0	69.4	2.9
SMF45A	45A / MV	50	55.3	1.0	45	1.0	72.7	2.8
SMF48A	48A / MX	53.3	58.9	1.0	48	1.0	77.4	2.6
SMF51A	51A / MZ	56.7	62.7	1.0	51	1.0	82.4	2.4
SMF54A	54A / NE	60	66.3	1.0	54	1.0	87.1	2.3
SMF58A	58A / NG	64.4	71.2	1.0	58	1.0	93.6	2.1
SMF60A	60A / NK	66.7	73.7	1.0	60	1.0	96.8	1.8
SMF64A	64A / NM	71.1	78.6	1.0	64	1.0	103	1.7
SMF70A	70A / NP	77.8	86	1.0	70	1.0	113	1.5
SMF75A	75A / NR	83.3	92.1	1.0	75	1.0	121	1.4
SMF78A	78A / NT	86.7	95.8	1.0	78	1.0	126	1.4
SMF85A	85A / NV	94.4	104	1.0	85	1.0	137	1.3
SMF90A	90A / NX	100	111	1.0	90	1.0	146	1.2
SMF100A	100 / NZ	111	123	1.0	100	1.0	162	1.1
SMF110A	110 / PE	122	135	1.0	110	1.0	177	1.0
SMF120A	120 / PG	133	147	1.0	120	1.0	193	0.9
SMF130A	130 / PK	144	159	1.0	130	1.0	209	0.8
SMF150A	150 / PM	167	185	1.0	150	1.0	243	0.7
SMF160A	160 / PP	178	197	1.0	160	1.0	259	0.7
SMF170A	170 / PR	189	209	1.0	170	1.0	275	0.6

## SMF5.0CA THRU SMF170CA

### ELECTRICAL CHARACTERISTICS @25°C

MCC PART NUMBER Bi-Polar	Marking Code	Breakdown Voltage $V_{BR} @ I_T$ (Volt)		TEST CURRENT $I_T$ mADC	RATED STANDOFF VOLTAGE $V_{WM}$ V	MAXIMUM REVERSE LEAKAGE $I_b @ V_{WM}$ ( $\mu$ A)	MAXIMUM CLAMPING VOLTAGE $V_C @ I_{PP}$ V	MAXIMUM PEAK PULSE CURRENT $I_{PP}$ A
		MIN	MAX					
SMF5.0CA	5.0CA / AE	6.4	7.0	10	5.0	400	9.2	21.7
SMF6.0CA	6.0CA / AG	6.67	7.37	10	6.0	400	10.3	19.4
SMF6.5CA	6.5CA / AK	7.22	7.98	10	6.5	250	11.2	17.9
SMF7.0CA	7.0CA / AM	7.78	8.6	10	7.0	100	12	16.7
SMF7.5CA	7.5CA / AP	8.33	9.21	1.0	7.5	50	12.9	15.5
SMF8.0CA	8.0CA / AR	8.89	9.83	1.0	8.0	25	13.6	14.7
SMF8.5CA	8.5CA / AT	9.44	10.4	1.0	8.5	10	14.4	13.9
SMF9.0CA	9.0CA / AV	10	11.1	1.0	9.0	5.0	15.4	13
SMF10CA	10CA / AX	11.1	12.3	1.0	10	2.5	17	11.8
SMF11CA	11CA / AZ	12.2	13.5	1.0	11	2.5	18.2	11
SMF12CA	12CA / BE	13.3	14.7	1.0	12	2.5	19.9	10.1
SMF13CA	13CA / BG	14.4	15.9	1.0	13	1.0	21.5	9.3
SMF14CA	14CA / BK	15.6	17.2	1.0	14	1.0	23.2	8.6
SMF15CA	15CA / BM	16.7	18.5	1.0	15	1.0	24.4	8.2
SMF16CA	16CA / BP	17.8	19.7	1.0	16	1.0	26	7.7
SMF17CA	17CA / BR	18.9	20.9	1.0	17	1.0	27.6	7.2
SMF18CA	18CA / BT	20	22.1	1.0	18	1.0	29.2	6.8
SMF20CA	20CA / BV	22.2	24.5	1.0	20	1.0	32.4	6.2
SMF22CA	22CA / BX	24.4	26.9	1.0	22	1.0	35.5	5.6
SMF24CA	24CA / BZ	26.7	29.5	1.0	24	1.0	38.9	5.1
SMF26CA	26CA / CE	28.9	31.9	1.0	26	1.0	42.1	4.8
SMF28CA	28CA / CG	31.1	34.4	1.0	28	1.0	45.4	4.4
SMF30CA	30CA / CK	33.3	36.8	1.0	30	1.0	48.4	4.1
SMF33CA	33CA / CM	36.7	40.6	1.0	33	1.0	53.3	3.8
SMF36CA	36CA / CP	40	44.2	1.0	36	1.0	58.1	3.4
SMF40CA	40CA / CR	44.4	49.1	1.0	40	1.0	64.5	3.1
SMF43CA	43CA / CT	47.8	52.8	1.0	43	1.0	69.4	2.9
SMF45CA	45CA / CV	50	55.3	1.0	45	1.0	72.7	2.8
SMF48CA	48CA / CX	53.3	58.9	1.0	48	1.0	77.4	2.6
SMF51CA	51CA / CZ	56.7	62.7	1.0	51	1.0	82.4	2.4
SMF54CA	54CA / DE	60	66.3	1.0	54	1.0	87.1	2.3
SMF58CA	58CA / DG	64.4	71.2	1.0	58	1.0	93.6	2.1
SMF60CA	60CA / DK	66.7	73.7	1.0	60	1.0	96.8	1.8
SMF64CA	64CA / DM	71.1	78.6	1.0	64	1.0	103	1.7
SMF70CA	70CA / DP	77.8	86	1.0	70	1.0	113	1.5
SMF75CA	75CA / DR	83.3	92.1	1.0	75	1.0	121	1.4
SMF78CA	78CA / DT	86.7	95.8	1.0	78	1.0	126	1.4
SMF85CA	85CA / DV	94.4	104	1.0	85	1.0	137	1.3
SMF90CA	90CA / DX	100	111	1.0	90	1.0	146	1.2
SMF100CA	100C / DZ	111	123	1.0	100	1.0	162	1.1
SMF110CA	110C / EE	122	135	1.0	110	1.0	177	1.0
SMF120CA	120C / EG	133	147	1.0	120	1.0	193	0.9
SMF130CA	130C / EK	144	159	1.0	130	1.0	209	0.8
SMF150CA	150C / EM	167	185	1.0	150	1.0	243	0.7
SMF160CA	160C / EP	178	197	1.0	160	1.0	259	0.7
SMF170CA	170C / ER	189	209	1.0	170	1.0	275	0.6

## SMF5.0CA THRU SMF170CA

### Electrical Characteristics

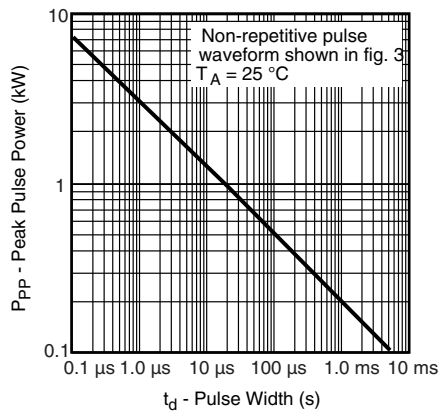


Fig. 1 - Peak Pulse Power Rating

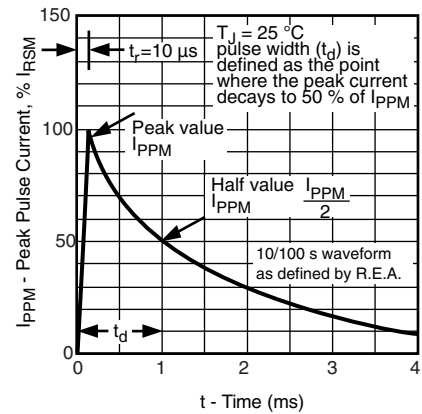


Fig. 3 - Pulse Waveform

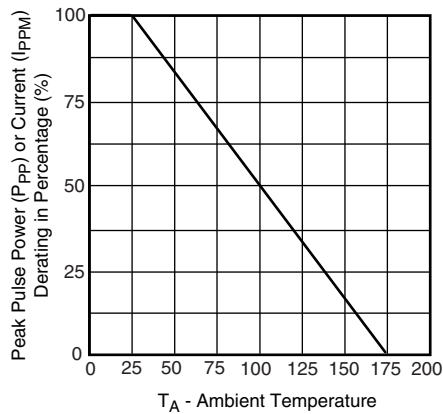


Fig. 2 - Pulse Derating Curve



TM

Micro Commercial Components

## Ordering Information :

Device	Packing
Part Number-TP	Tape&Reel: 2.5Kpcs/Reel

Note : Adding "-HF" suffix for halogen free, eg. Part Number-TP-HF

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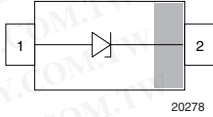
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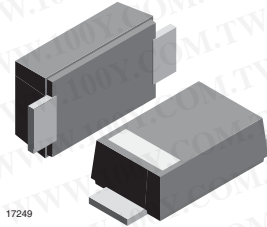
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## Surface Mount ESD Protection Diodes



20278



17249

### MARKING (example only)



22623

Bar = cathode marking

YY = type code (see table below)

XX = date code

### FEATURES

- 200 W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetition rate (duty cycle): 0.01 %
- Low-profile package
- Wave and reflow solderable
- ESD-protection acc. IEC 61000-4-2  $\pm$  30 kV contact discharge  $\pm$  30 kV air discharge
- ESD capability according to AEC-Q101: human body model: class H3B: > 8 kV
- Low incremental surge resistance, excellent clamping capability
- “Low-Noise” technology - very fast response time
- AEC-Q101 qualified available
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE  
Available

**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
Available

ORDERING INFORMATION							
PART NUMBER (EXAMPLE)	ENVIRONMENTAL AND QUALITY CODE				PACKAGING CODE		ORDERING CODE (EXAMPLE)
	AEC-Q101 QUALIFIED	RoHS-COMPLIANT + LEAD (Pb)-FREE TERMINATIONS		TIN PLATED	3K PER 7" REEL (8 mm TAPE), 30K/BOX = MOQ	10K PER 13" REEL (8 mm TAPE), 50K/BOX = MOQ	
		STANDARD	HALOGEN-FREE				
SMF5V0A-		E		3	-08		SMF5V0A-E3-08
SMF5V0A-			M	3	-08		SMF5V0A-M3-08
SMF5V0A-	H	E		3	-08		SMF5V0A-HE3-08
SMF5V0A-	H		M	3	-08		SMF5V0A-HM3-08
SMF5V0A-		E		3		-18	SMF5V0A-E3-18
SMF5V0A-			M	3		-18	SMF5V0A-M3-18
SMF5V0A-	H	E		3		-18	SMF5V0A-HE3-18
SMF5V0A-	H		M	3		-18	SMF5V0A-HM3-18

PACKAGE DATA									
PACKAGE NAME	MOLDING COMPOUND	WEIGHT (mg)	HEIGHT MAX. (mm)	LENGTH MAX. (mm)	WIDTH MAX. (mm)	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	WHISKER TEST ACC. JESD 201	SOLDERING CONDITIONS
SMF (DO-219AB)	Standard	15	1.08	3.9	1.9	UL 94 V-0	MSL level 1 (acc. J-STD-020)	class 2	Peak temperature max. 260 °C
	Halogen-free								

勝特力材料 886-3-5753170  
 勝特力电子(上海) 86-21-34970699  
 勝特力电子(深圳) 86-755-83298787  
[Http://www.100y.com.tw](http://www.100y.com.tw)





ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	t <sub>p</sub> = 10/1000 μs waveform	I <sub>PPM</sub>	see "Electrical Characteristics"	A
Peak pulse power	t <sub>p</sub> = 8/20 μs waveform acc. IEC 61000-4-5	P <sub>PP</sub>	1000	W
	t <sub>p</sub> = 10/1000 μs waveform		200	W
Peak forward surge current	8.3 ms single half sine-wave	I <sub>FSM</sub>	50	A
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V <sub>ESD</sub>	± 30	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses		± 30	kV
Thermal resistance	Mounted on epoxy glass PCB with 3 mm x 3 mm, Cu pads (≥ 40 μm thick)	R <sub>thJA</sub>	180	K/W
Forward clamping voltage	I <sub>F</sub> = 50A, t <sub>p</sub> = 400 μs	V <sub>F</sub>	2.5	V
Junction temperature		T <sub>J</sub>	175	°C
Storage temperature range		T <sub>stg</sub>	-65 to +175	°C
Operating temperature range		T <sub>op</sub>	-65 to +175	°C

ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)										
PART NUMBER	TYPE CODE		REVERSE BREAKDOWN VOLTAGE at I <sub>T</sub> , t <sub>p</sub> = 5 ms	TEST CURRENT	REVERSE WORKING VOLTAGE	REVERSE CURRENT at V <sub>RWM</sub>	PEAK PULSE CURRENT t <sub>p</sub> = 10/1000 μs	REVERSE CLAMPING VOLTAGE at I <sub>PPM</sub>	CAPACITANCE at V <sub>R</sub> = 0 V, f = 1 MHz	PROTECTION PATHS
	STD.	HALOGEN-FREE	V <sub>BR</sub> MIN. (V)	I <sub>T</sub> (mA)	V <sub>RWM</sub> (V)	I <sub>R</sub> (μA)	I <sub>PPM</sub> (A)	V <sub>C</sub> MAX. (V)	C <sub>D</sub> TYP. (pF)	N <sub>channel</sub>
SMF5V0A	AE	NE	6.40	10	5	5	21.7	9.2	1120	1
SMF6V0A	AG	NG	6.67	10	6	26	19.4	10.3	1063	1
SMF6V5A	AK	NK	7.22	10	6.5	20	17.9	11.2	938	1
SMF7V0A	AM	NM	7.78	10	7	3	16.7	12	843	1
SMF7V5A	AP	NP	8.33	1	7.5	0.1	15.5	12.9	773	1
SMF8V0A	AR	NR	8.89	1	8	0.1	14.7	13.6	706	1
SMF8V5A	AT	NT	9.44	1	8.5	0.1	13.9	14.4	674	1
SMF9V0A	AV	NV	10	1	9	0.1	13.5	15.4	640	1
SMF10A	AX	NX	11.1	1	10	0.1	11.8	17	562	1
SMF11A	AZ	NZ	12.2	1	11	0.1	11	18.2	509	1
SMF12A	BE	OE	13.3	1	12	0.1	10.1	19.9	483	1
SMF13A	BG	OG	14.4	1	13	0.1	9.3	21.5	423	1
SMF14A	BK	OK	15.6	1	14	0.1	8.6	23.2	392	1
SMF15A	BM	OM	16.7	1	15	0.1	8.2	24.4	367	1
SMF16A	BP	OP	17.8	1	16	0.1	7.7	26	343	1
SMF17A	BR	OR	18.9	1	17	0.1	7.2	27.6	324	1
SMF18A	BT	OT	20	1	18	0.1	6.8	29.2	320	1
SMF20A	BV	OV	22.2	1	20	0.1	6.2	32.4	283	1
SMF22A	BX	OX	24.4	1	22	0.1	5.6	35.5	271	1
SMF24A	BZ	OZ	26.7	1	24	0.1	5.1	38.9	244	1
SMF26A	CE	PE	28.9	1	26	0.1	4.8	42.1	230	1
SMF28A	CG	PG	31.1	1	28	0.1	4.4	45.4	227	1
SMF30A	CK	PK	33.3	1	30	0.1	4.1	48.4	207	1
SMF33A	CM	PM	36.7	1	33	0.1	3.8	53.3	198	1
SMF36A	CP	PP	40	1	36	0.1	3.4	58.1	178	1
SMF40A	CR	PR	44.4	1	40	0.1	3.1	64.5	172	1
SMF43A	CT	PT	47.8	1	43	0.1	2.9	69.4	165	1
SMF45A	CV	PV	50	1	45	0.1	2.8	72.7	162	1
SMF48A	CX	PX	53.3	1	48	0.1	2.6	77.4	161	1
SMF51A	CZ	PZ	56.7	1	51	0.1	2.4	82.4	151	1
SMF54A	CA	PA	60	1	54	0.1	2.25	88	148	1
SMF58A	CC	PC	64.4	1	58	0.1	2.1	95	144	1

## TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

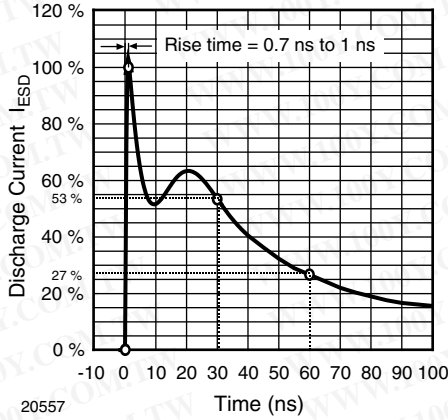


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω/150pF)

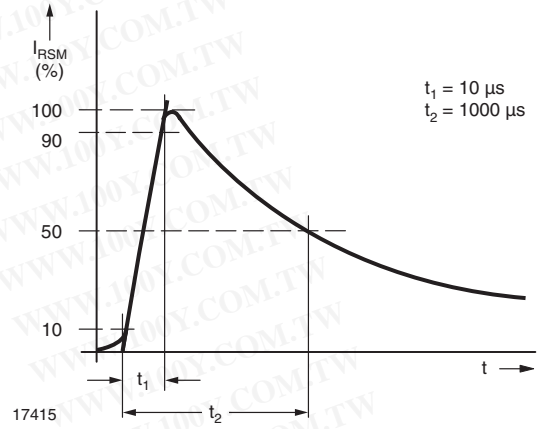


Fig. 4 - Pulse Waveform

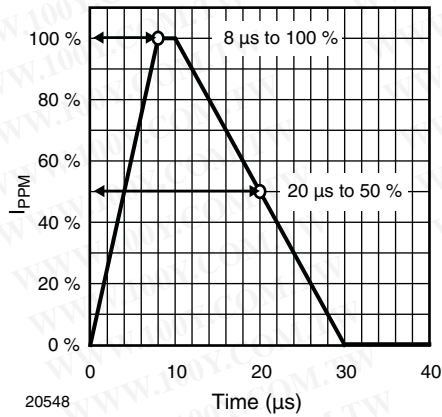


Fig. 2 - 8/20 μs Peak Pulse Current Wave Form acc. IEC 61000-4-5

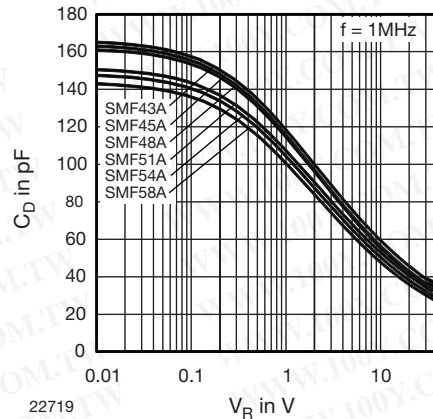


Fig. 5 - Typical Capacitance C<sub>D</sub> vs. Reverse Voltage V<sub>R</sub>

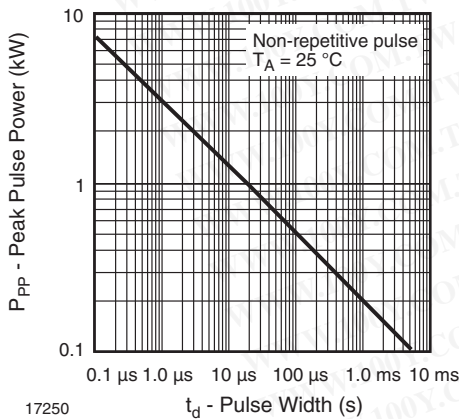


Fig. 3 - Peak Pulse Power Rating

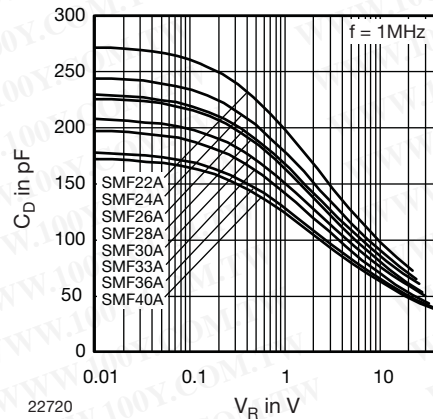


Fig. 6 - Typical Capacitance C<sub>D</sub> vs. Reverse Voltage V<sub>R</sub>



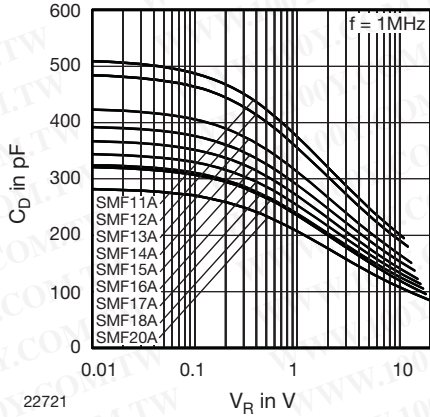


Fig. 7 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

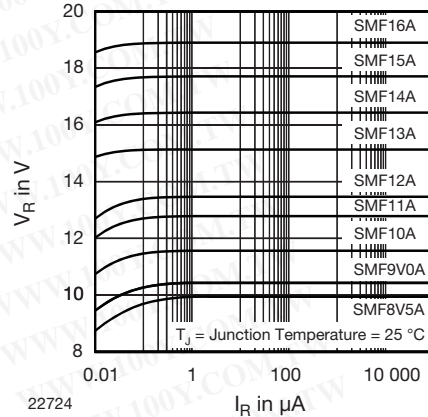


Fig. 10 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

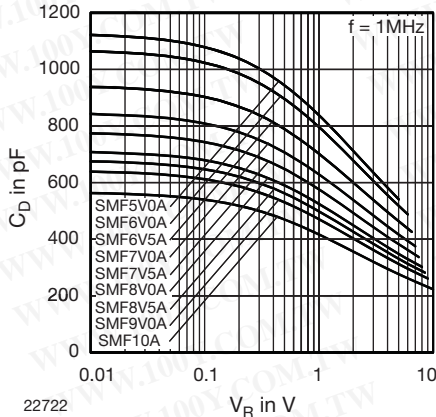


Fig. 8 - Typical Capacitance  $C_D$  vs. Reverse Voltage  $V_R$

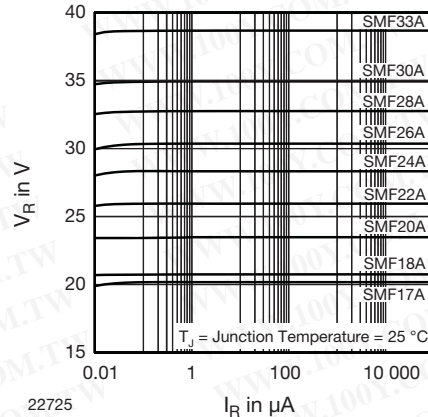


Fig. 11 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

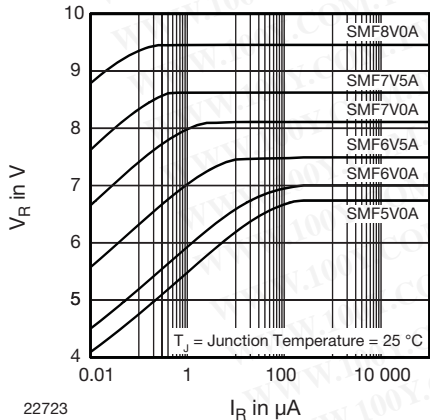


Fig. 9 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$

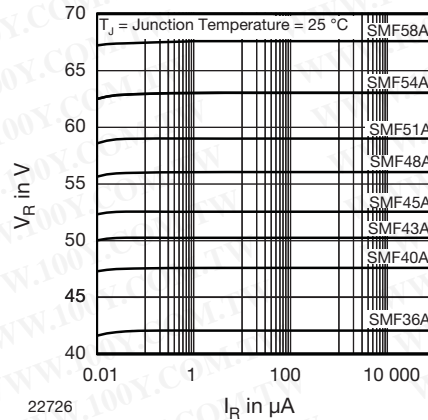
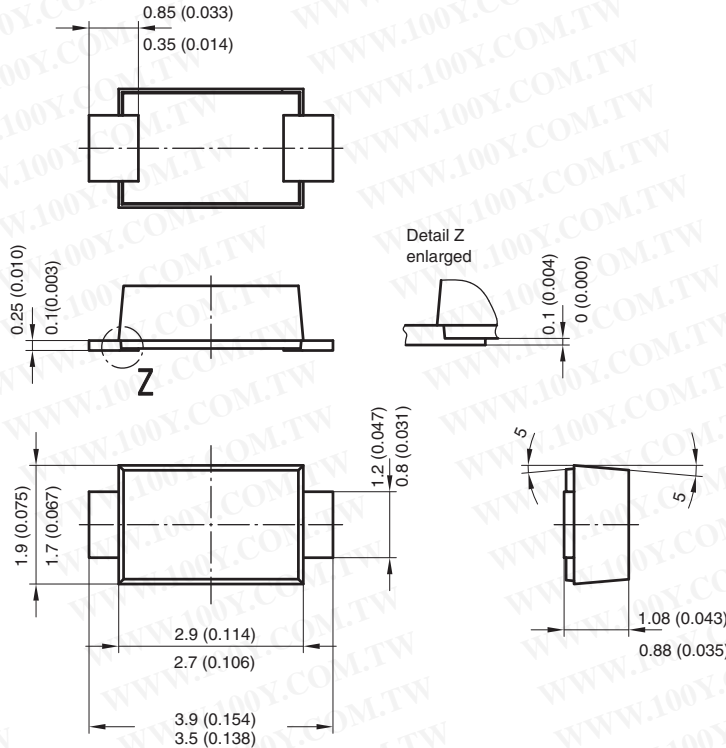


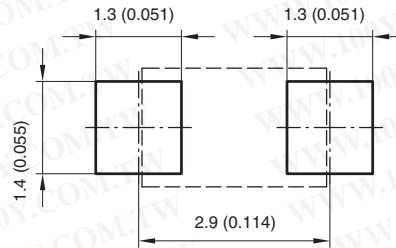
Fig. 12 - Typical Reverse Voltage  $V_R$  vs. Reverse Current  $I_R$



## PACKAGE DIMENSIONS in millimeters (inches): SMF



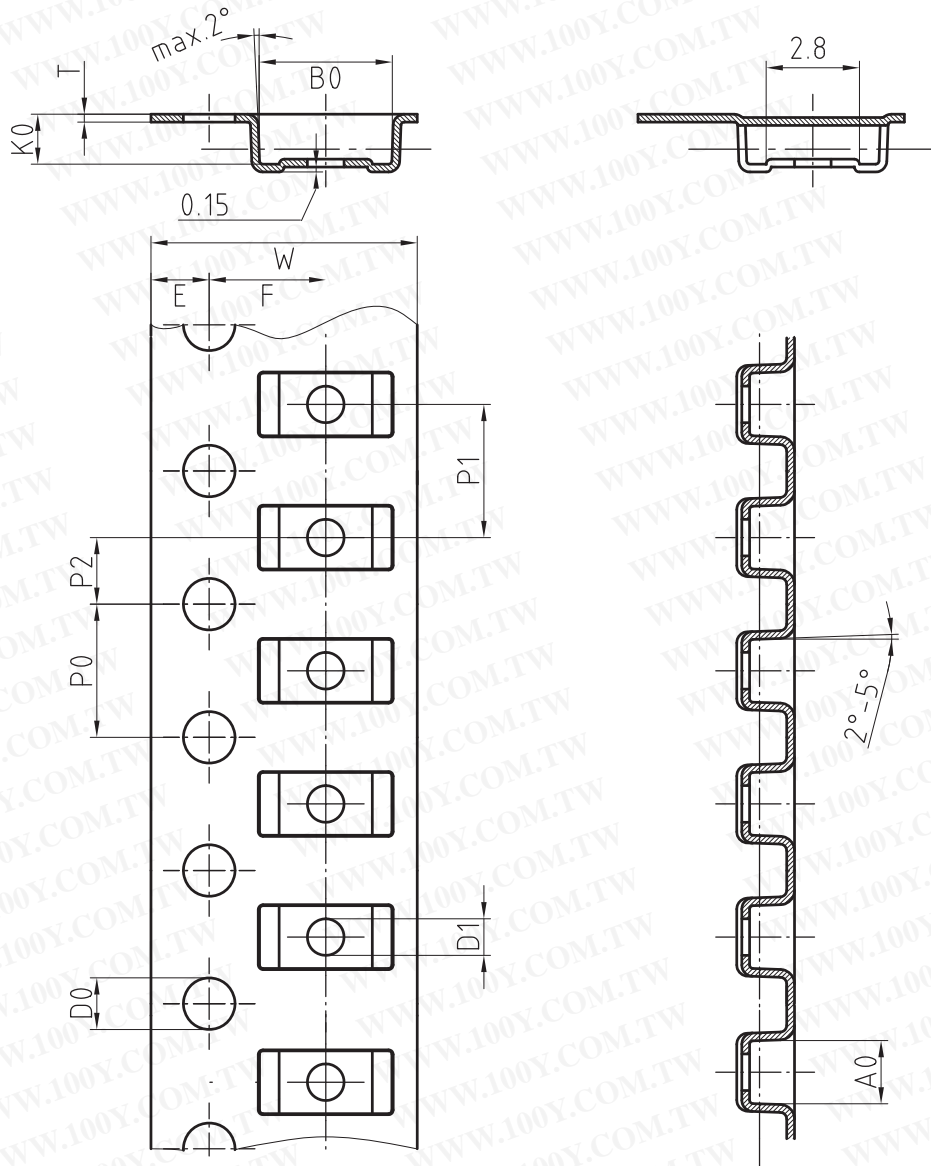
Foot print recommendation:



Created - Date: 15. February 2005  
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 17247



**BLISTERTAPE DIMENSIONS** in millimeters (inches)



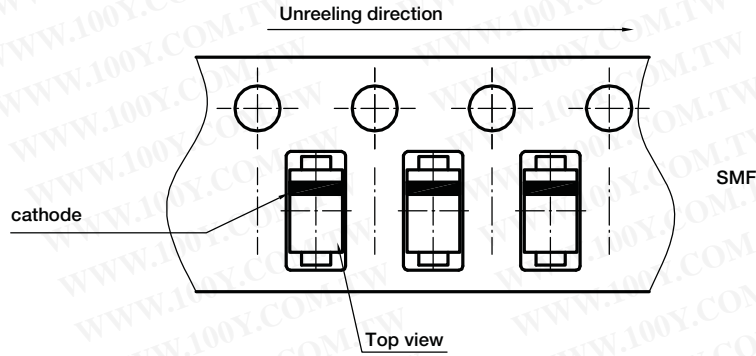
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PS	1.9	4.0	1.5	8.0	0.235	4.0	2.0	4.0	1.5	1	1.75	3.5

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## ORIENTATION IN CARRIER TAPE - SMF



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